FIG. 1

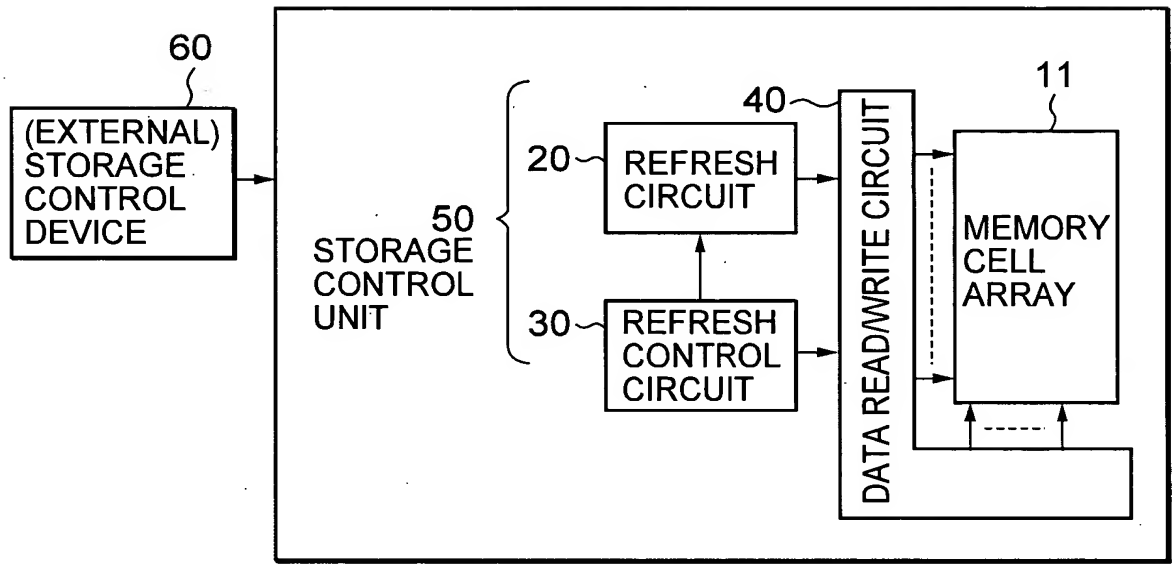
60
(EXTERNAL) STORAGE CONTROL DEVICE
50
STORAGE CONTROL UNIT
20
REFRESH CIRCUIT
30
REFRESH CONTROL CIRCUIT
40
DATA READ/WRITE CIRCUIT
11
MEMORY CELL ARRAY

FIG. 2

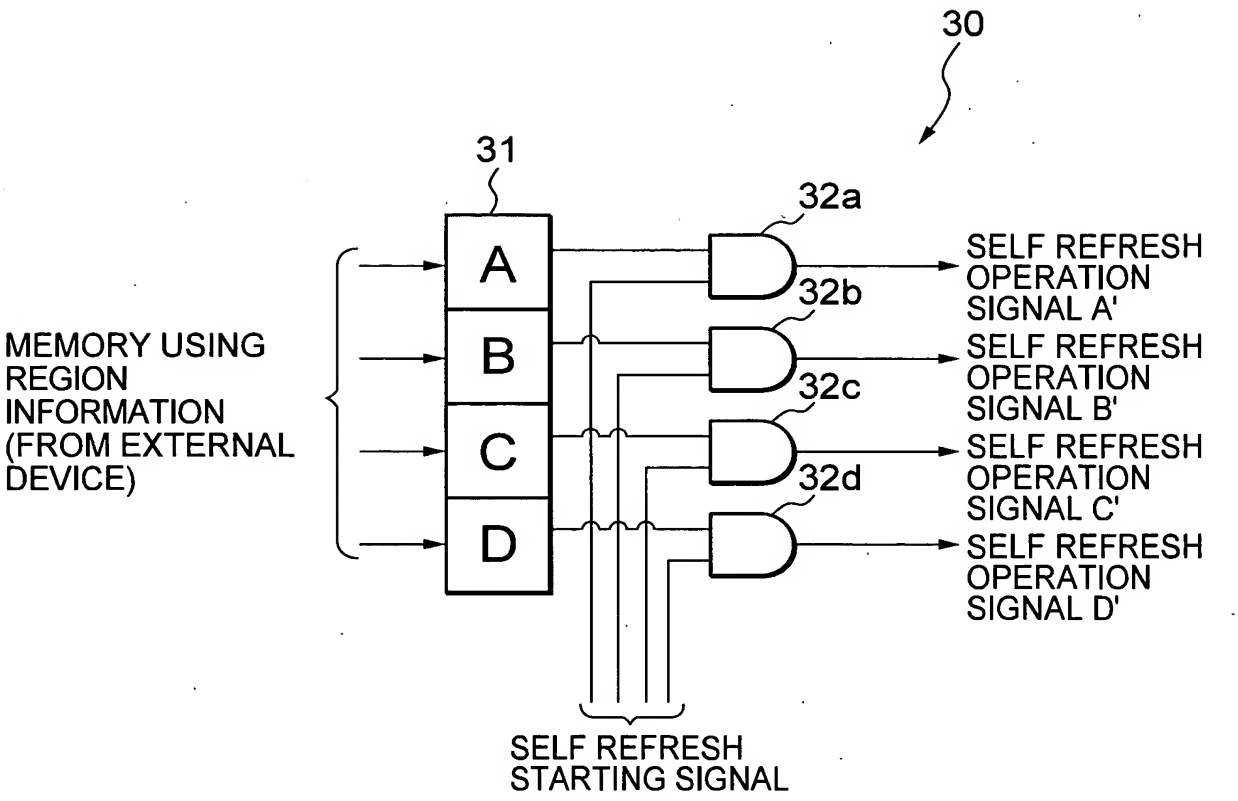

FIG. 3

INFORMATION IN REGISTER	SELF REFRESH PERFORMING REGION
BIT A IS "1"	REGION A
BIT B IS "1"	REGION B
BIT C IS "1"	REGION C
BIT D IS "1"	REGION D

FIG. 4

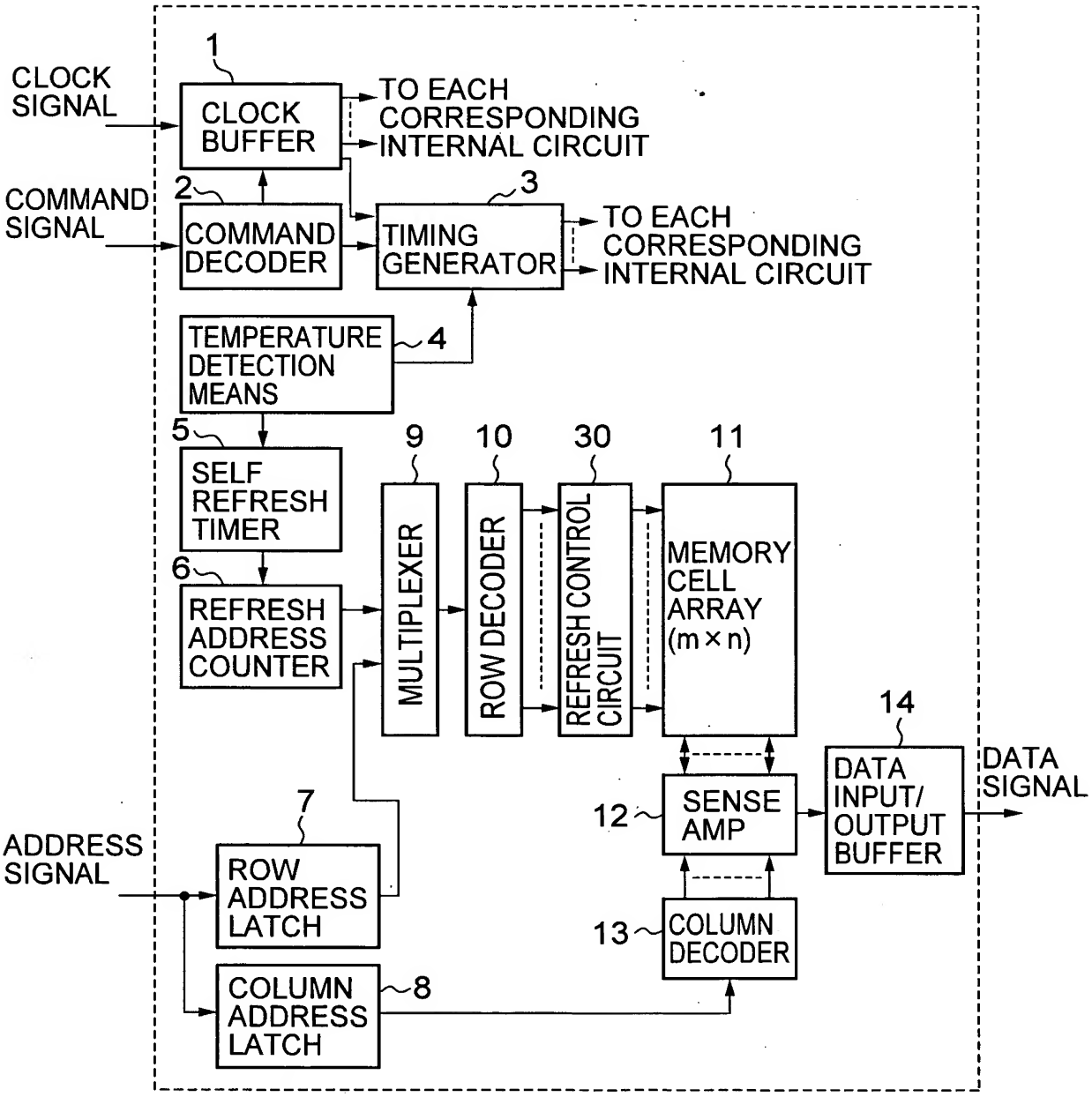
CLOCK SIGNAL
1
CLOCK BUFFER
TO EACH CORRESPONDING INTERNAL CIRCUIT
COMMAND SIGNAL
2
COMMAND DECODER
3
TIMING GENERATOR
TO EACH CORRESPONDING INTERNAL CIRCUIT
TEMPERATURE DETECTION MEANS
4
5
SELF REFRESH TIMER
6
REFRESH ADDRESS COUNTER
9
MULTIPLEXER
10
ROW DECODER
30
REFRESH CONTROL CIRCUIT
11
MEMORY CELL ARRAY (m × n)
14
DATA INPUT/ OUTPUT BUFFER
DATA SIGNAL
12
SENSE AMP
13
COLUMN DECODER
ADDRESS SIGNAL
7
ROW ADDRESS LATCH
COLUMN ADDRESS LATCH
8

FIG. 5

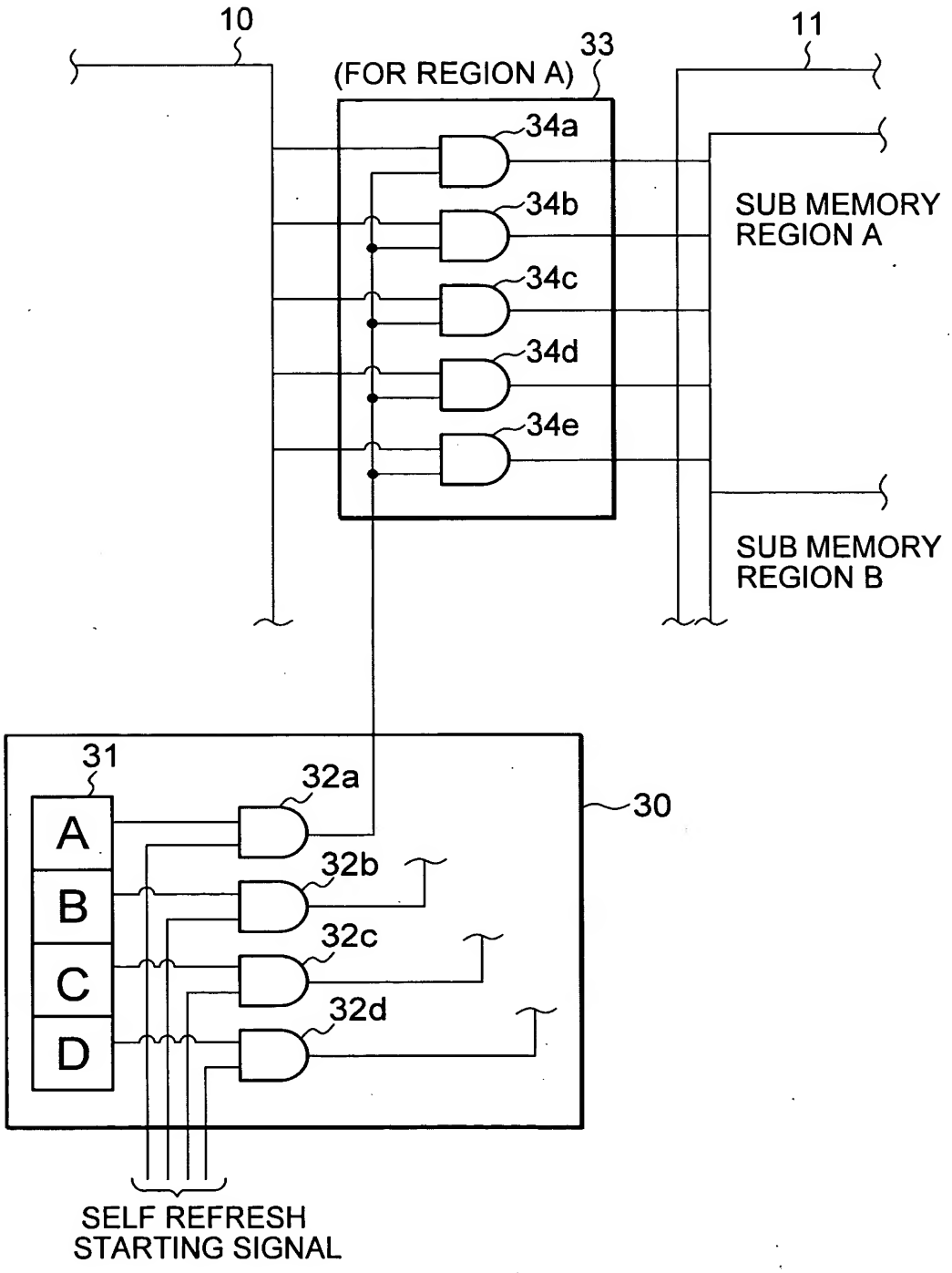
10
11
33
(FOR REGION A)
34a
34b
34c
34d
34e
SUB MEMORY REGION A
SUB MEMORY REGION B
31
32a
30
A
B
C
D
32b
32c
32d
SELF REFRESH STARTING SIGNAL

FIG. 6

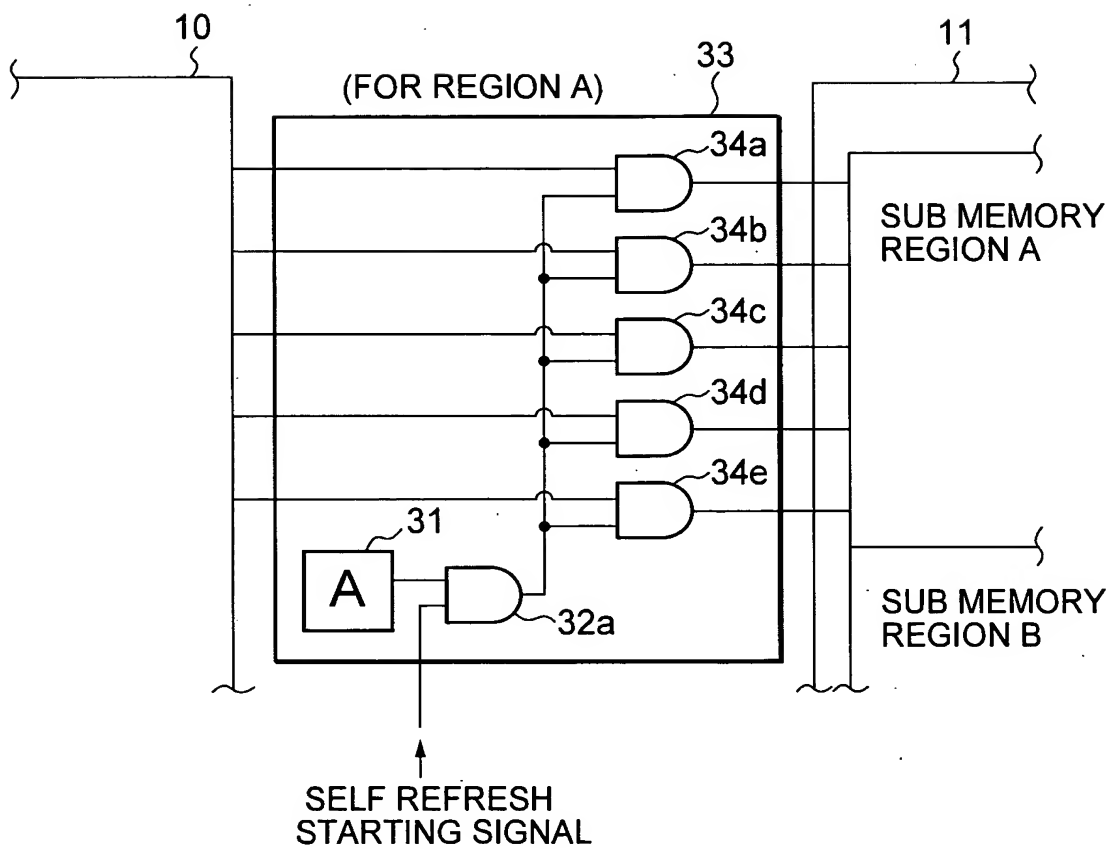
10
(FOR REGION A)
33
11
34a
34b
34c
34d
34e
SUB MEMORY REGION A
31
A
32a
SUB MEMORY REGION B
SELF REFRESH STARTING SIGNAL

FIG. 7

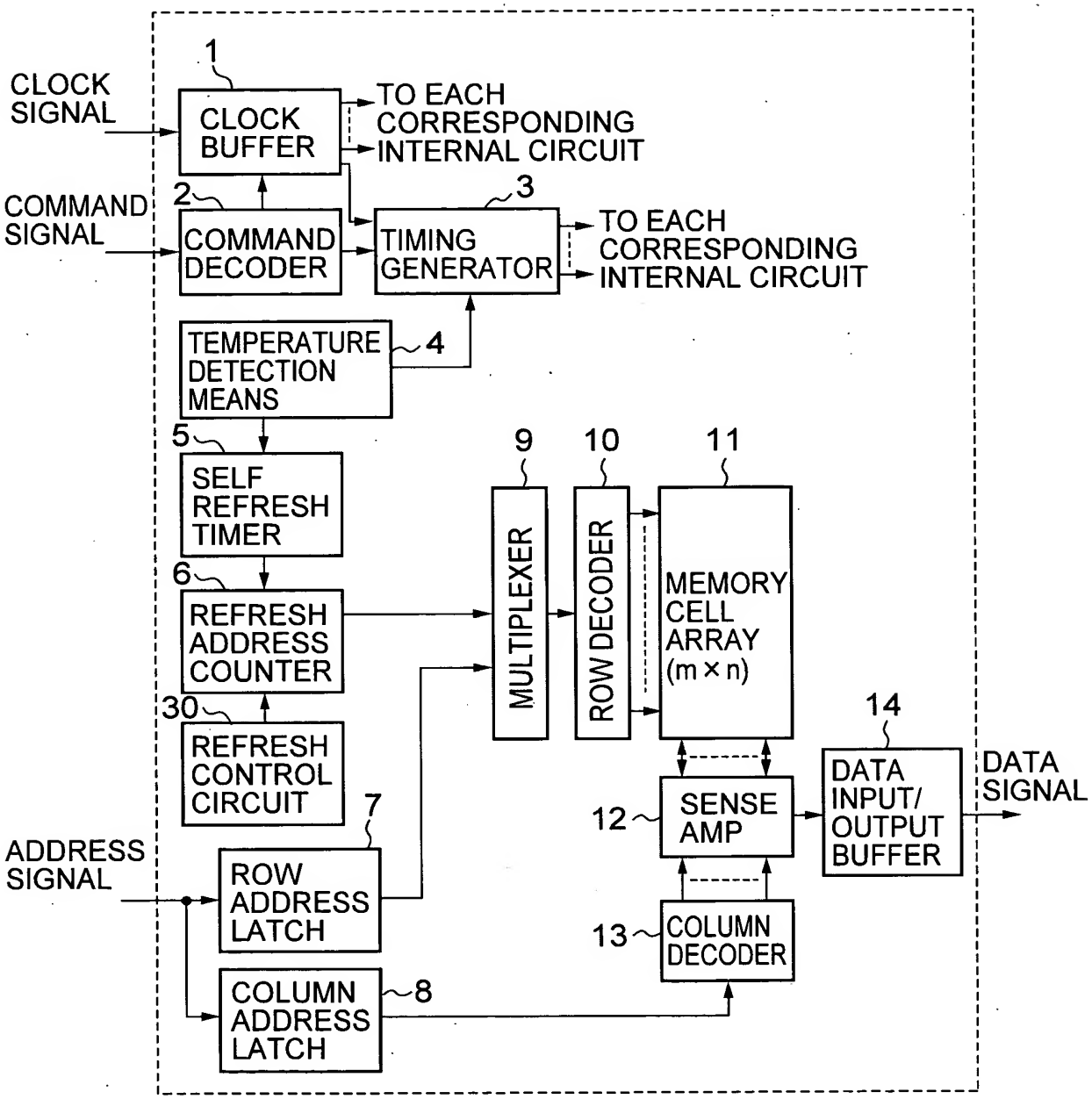
CLOCK SIGNAL
1
CLOCK BUFFER
TO EACH CORRESPONDING INTERNAL CIRCUIT
COMMAND SIGNAL
2
COMMAND DECODER
3
TIMING GENERATOR
TO EACH CORRESPONDING INTERNAL CIRCUIT
TEMPERATURE DETECTION MEANS
4
5
SELF REFRESH TIMER
6
REFRESH ADDRESS COUNTER
30
REFRESH CONTROL CIRCUIT
9
MULTIPLEXER
10
ROW DECODER
11
MEMORY CELL ARRAY (m × n)
14
DATA INPUT/ OUTPUT BUFFER
DATA SIGNAL
12
SENSE AMP
13
COLUMN DECODER
ADDRESS SIGNAL
7
ROW ADDRESS LATCH
COLUMN ADDRESS LATCH
8

FIG. 8

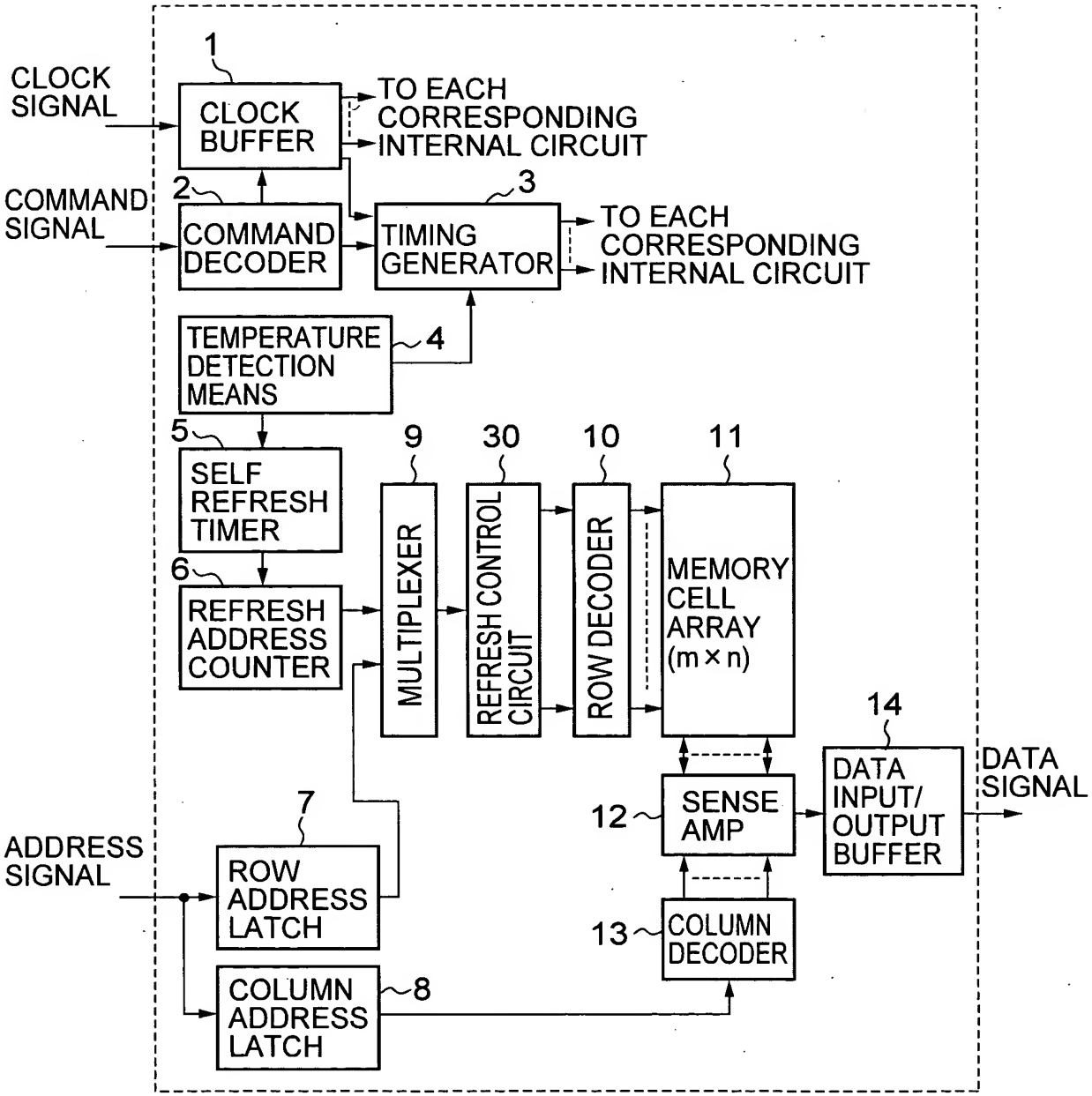
CLOCK SIGNAL
1
CLOCK BUFFER
TO EACH CORRESPONDING INTERNAL CIRCUIT
COMMAND SIGNAL
2
COMMAND DECODER
3
TIMING GENERATOR
TO EACH CORRESPONDING INTERNAL CIRCUIT
TEMPERATURE DETECTION MEANS
4
5
SELF REFRESH TIMER
6
REFRESH ADDRESS COUNTER
9
MULTIPLEXER
30
REFRESH CONTROL CIRCUIT
10
ROW DECODER
11
MEMORY CELL ARRAY (m × n)
14
DATA INPUT/ OUTPUT BUFFER
DATA SIGNAL
12
SENSE AMP
ADDRESS SIGNAL
7
ROW ADDRESS LATCH
13
COLUMN DECODER
COLUMN ADDRESS LATCH
8

FIG. 9

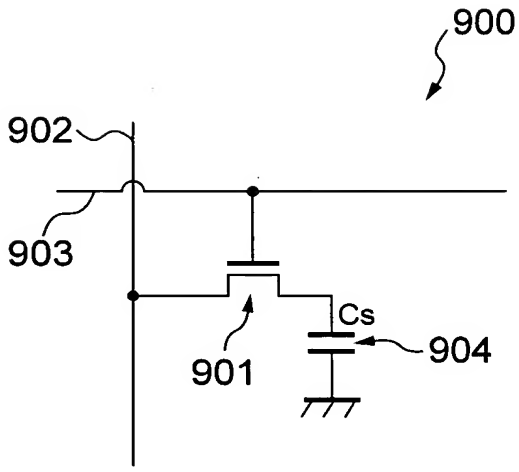

FIG. 10

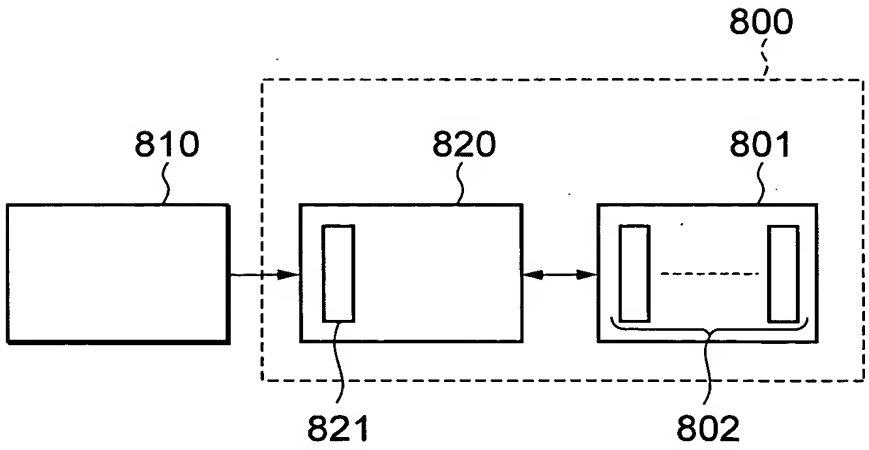

FIG. 11

CONTENTS OF MODE REGISTER	SELF REFRESH PERFORMING REGION
"00"	ALL OF REGIONS A, B, C, D
"01"	REGIONS A, B, C
"10"	REGIONS A, B
"11"	REGION A
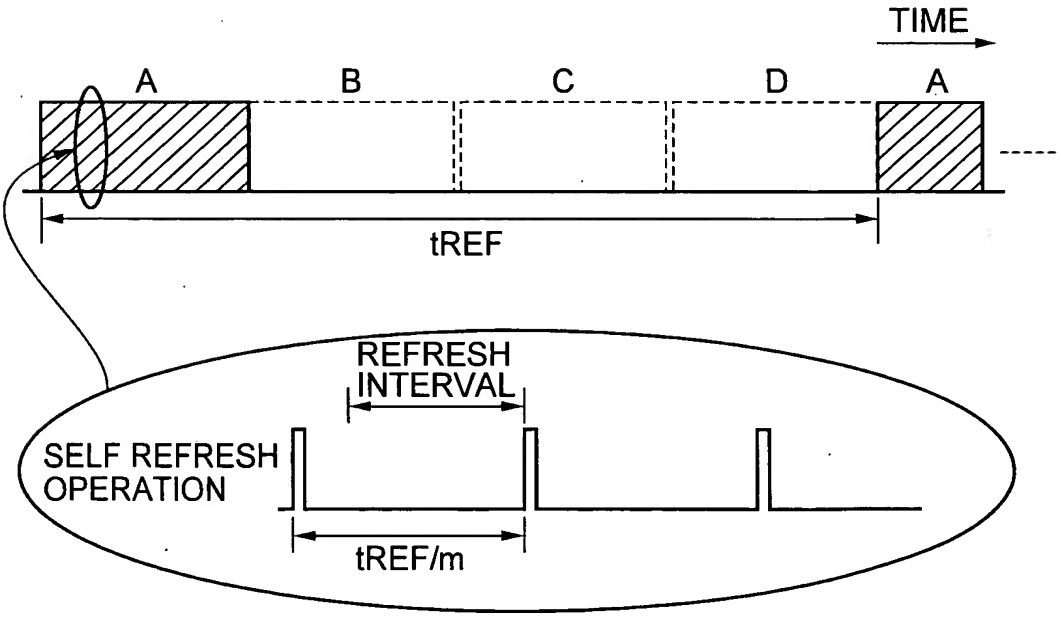
FIG. 12